NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

Forage Harvest Management

(Acre)

Code 511

DEFINITION

The timely cutting and removal of forages from the field as hay, green-chop, or ensilage.

PURPOSES

- Optimize the economic yield of forage at the desired quality and quantity
- Promote vigorous plant regrowth
- Maintain stand life for the desired time period
- Maintain desired species composition of the stand
- Use forage plant biomass as a nutrient uptake tool
- Control insects, diseases and weeds
- Maintain and/or improve wildlife habitat

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all land uses where machine harvested forage crops are grown.

CRITERIA

General criteria applicable to all purposes

Forage will be harvested at a frequency and height that will maintain a desired healthy plant community through its life expectancy. (Use Table 1 and other references as guidance.)

Stage of Maturity

Harvest forage at the stage of maturity that provides the desired quality, quantity, and stand persistence.

Delay harvest if prolonged or heavy precipitation is forecast that would seriously damage cut forage.

Where weather conditions make it difficult to harvest the desired quality of forage, use mechanical or chemical conditioners and/or ensile.

Moisture Content

Harvest silage/haylage crops at the ideal moisture range for the type of storage structure(s) being utilized.

Treat direct cut hay crop silage (moisture content > 70%) with chemical preservatives or add dry feed stuffs to avoid fermentation and seepage losses of digestible dry matter.

For optimal forage quality, rake, ted, or invert swaths, and bale when hay has sufficient moisture to prevent leaf loss.

Bale at optimum moisture levels to preserve forage quality and quantity. Approximate percent moisture should be as follows:

- Bale field cured hay at 15 to 20 percent moisture.
- Bale forced air dried hay at 20 to 35 percent moisture.
- Rake hay at 30 to 40 percent moisture.

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

Indiana NRCS FOTG – December 1999.

- Ted or invert swaths when moisture is above 40 percent.

Length of cut

When harvested for ensilage, forage will be chopped to a size that allows adequate packing to produce anaerobic conditions necessary to ensure proper fermentation.

Contaminants

Forage shall not contain contaminants at levels injurious to the health of the livestock class and type being fed.

Contaminants are any objectionable matter or toxin that can cause illness, death, or rejection of the offered forage (i.e., sand burs, poisonous plants, hardware (wire), alkaloid containing forages to sensitive livestock species, and drought stressed or frosted cyanogenic forages such as sorghum-sudangrass).

Additional criteria to improve or maintain stand life, plant vigor, and forage species mix

Stage of Maturity and Harvest Interval

Cut forage plants at a stage of maturity or harvest interval range that will provide adequate food reserves and/or basal or auxiliary tillers or buds for regrowth and/or reproduction to occur without loss of plant vigor.

Cut reseeding annuals at a stage of maturity and frequency that ensures the production of viable seed or ample carryover of hard seed to maintain desired stand density.

If plants show signs of short-term environmental stress, management will be applied in a manner that ensures continued health and vigor of stand.

Stubble Height

Cut forage plants at a height that will promote the vigor and health of the desired species. Cutting heights will provide adequate residual leaf area; adequate numbers of terminal, basal, or auxiliary tillers or buds; insulation from extreme heat or cold; and/or unsevered stem bases that store food reserves needed for full, vigorous recovery.

Harvest warm-season perennial grasses (switchgrass, big bluestem, indiangrass) at a minimum height of 6 inches to prolong the life of the stand. Shorter cuttings can substantially reduce yield the following season because of less carbohydrate reserves.

Manipulate timing and cutting heights of harvest to ensure germination and establishment of reseeding or seeded annuals.

Additional criteria to control disease, insect, and weed infestations

If disease, insects, or weeds threaten stand survival or production objective, schedule harvest periods as needed to control disease, insect, and weed infestations.

Lessen incidence of disease, insect damage, and weed infestation by managing for desirable plant vigor.

Additional criteria to improve wildlife habitat

Maintain appropriate harvest schedule(s), cover patterns, and plant height to provide suitable habitat for the desired species.

CONSIDERATIONS

When pastures produce forage in excess of livestock demand during high growth rate periods, consider preserving forage quality by machine harvesting a portion of the standing crop. Coordinate this practice with (528A) Prescribed Grazing.

Well-fertilized plants withstand more intense harvest schedules and may produce a higher quantity and quality of forage. Coordinate this practice with (590) Nutrient Management.

Select species and cultivars that are suitable for the purpose.

For specific nutrient uptake, select species that can maximize uptake. See (512) Pasture and Hay Planting.

When insect and disease outbreaks exceed economic thresholds and are uncontrollable by harvest management, pesticide applications may be needed. Another option is to select a resistant

cultivar when the stand is replaced. See (595) Pest Management.

To control forage plant diseases, insects, and weeds, clean harvesting equipment after harvest and before storing.

When weed infestation exceeds the economic threshold and is uncontrollable by forage harvest management alone, weed management should be planned and applied.

Delaying forage harvest till midday or later can increase carbohydrate content and forage value.

Take care not to produce stored forages whose quality is not that needed for optimum performance of the animal being fed. For instance, immature legume forages can be too low in fiber and lead to metabolic disorders in ruminants and an economic loss to the producer due to lowered animal performance.

Direct cut grass and legume silage can create silage leachate (seepage). Consider the collection, storage, and disposal of this leachate as part of an agricultural waste management system.

In conjunction with harvest options, explore storage and feeding options that will retain acceptable forage quality and minimize digestible dry matter loss.

In regions where rainfall and/or humidity levels cause unacceptable forage quality losses in at least one harvest during the year, consider ensiling the forage to reduce or eliminate field drying time. Other options are: the use of drying agents, preservatives, conditioners, macerating implements, barn curing techniques to reduce field drying time, greenchopping, or grazing. These techniques can improve the timeliness of harvest and preserve forage quality.

To reduce safety hazards, avoid operating harvesting and hauling equipment on field slopes over 25 percent, particularly on cross slope traffic patterns.

PLANS AND SPECIFICATIONS

Place the detailed specifications in a site specific job or design sheet, or in the practice narrative in the conservation plan.

These plans and specifications shall be consistent with this standard and shall describe the requirement for applying the practice to achieve its intended purpose.

OPERATION AND MAINTENANCE

Before forage harvest, clear fields of debris that could damage machinery or if ingested by livestock lead to sickness (i.e., hardware disease) or death.

Monitor weather conditions and take action accordingly before and after cutting to optimize forage wilting or curing time, preserve feed quality, and prevent forage swaths or windrows from smothering underlying plants.

Inspect and repair harvesting equipment following manufacturer's preventative maintenance procedures.

All shields shall be in place during machine operation to prevent injury or death. Shut off machinery before working on or unplugging moving parts.

Select equipment sizes and capacities that will in a timely and economically feasible manner handle the acreage normally harvested.

Operate all forage harvesting equipment at the optimum settings and speeds to minimize loss of leaves.

Set the shear-plate on the forage chopper to the proper theoretical cut for the crop being harvested. Keep knives well sharpened. Do not use recutters or screens unless forage moisture levels fall below recommended levels for optimum chopping action.

Regardless of silage/haylage storage method, ensure good compaction and an air-tight seal to exclude oxygen and mold formation.

REFERENCES

Ball, D. M., C. S. Hoveland, & G. D. Lacefield, Southern Forages, 1991. Potash & Phosphate Institute, Norcross, GA.

Barnes, R. F., D. A. Miller, & C. J. Nelson, Forages, The Science of Grassland Agriculture,

Fifth Edition, 1995. Iowa State University Press, Ames, IA.

Kaiser, C.J., Management of Legumes and Grasses, Shawnee RC&D, Marion, IL.

Table 1. Harvest Guide for some commonly grown forage species in Indiana

Species	Management[2/]	When to cut for excellent quality	Overwintering Height (inches)
Kentucky Bluegrass	1 to 2 cuttings	Boot	3
Orchardgrass, Tall Fescue and other non-jointed grasses	1 to 2 cuttings	Boot and peak regrowth	3 to 4
Smooth brome, Timothy, Reed Canary and other jointed grasses	1 to 2 cuttings (2 to 3 for Reed Canarygrass)	Boot and peak regrowth	5 to 6
Alfalfa	3 to 5 cuttings (every 30 to 35 days)	Late bud to early bloom	6
Birdsfoot Trefoil	2 to 3 cuttings	¼ to full bloom	5
Ladino & Alsike Clover	1 to 2 cuttings	Early to ½ bloom	3
Red Clover	2 to 3 cuttings	Early to ½ bloom	5
Crownvetch	1 to 2 cuttings (every 60 days)	Early to ½ bloom	5
Sudangrass	1 to 3 cuttings [3/]	Boot	N/A
Sorghum-sudangrass Hybrid, Pearl Millet and Japanese Millet	1 to 3 cuttings [3/]	Boot	N/A
Small Grains	1 cutting	Early head	N/A
Switchgrass, Big Bluestem, Indiangrass, Little Bluestem and Sideoats Grama[1/]	1 to 2 cuttings	Boot to early head	8 to 12 Little Bluestem & S.O. Grama 6-10
Annual Lespedeza	1 cutting	Early bloom [4/]	N/A

[1/] Leave a minimum 8 to 10-inch stubble at the end of season until after a killing frost. Do not mow any shorter than 6 inches or the stand will be affected.

[2/] Subsequent cuttings are dependent upon photosynthetic activity, carbohydrate reserves and soil moisture.

[3/] Dependent upon seeding date.

[4/] Must allow time to set seed during season.

Boot: Most heads in upper leaf sheath, but prior to emergence.
Early Head: Tips emerging on not more than 10% of stems.
Medium Head: About 50% of the heads emerged or emerging.
Full Head: Most heads fully emerged, but prior to flowering.